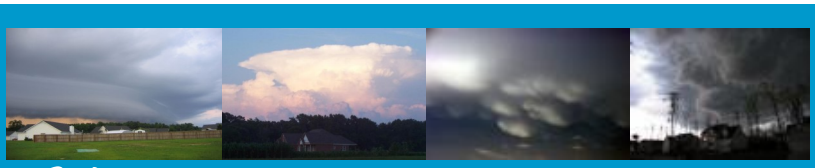

Changing Skies Over Central North Carolina

VOLUME 8, ISSUE 3 FALL/WINTER 2011

NOAA'S NATIONAL WEATHER SERVICE RALEIGH, NC

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Remembering Winters Past

Central North Carolina isn't the place most Americans would usually associate with interesting winter weather. But we have certainly had our share of significant, or even crippling, winter storms, especially in the last 20 years. Let's take a look back at some of these most memorable storms. How many do *you* remember?

A storm that was at the time considered the "Storm of the Century" because of its strength and the large area it affected, the winter storm of March 12-14, 1993, brought a wide range of dangerous weather to a large part of the nation from the Gulf Coast to the Northeast, including North Carolina. This storm began as an unusually strong low pressure centered over the Gulf of Mexico and steadily intensified as it tracked northeast, moving directly over the Triangle area and setting a record for lowest mean sea level pressure ever recorded at RDU Airport. In the mountains, winds gusted to 101 mph at Flattop Mountain and 64 mph at Asheville. Many locations in the mountains received 2 to 4 feet of snow, stranding motorists and residents for days, while the coastal sections of North Carolina experienced strong to severe thunderstorms.

Damage from the December 2002 ice storm

Experiencing two feet of snow in the mountains is one thing; having that much snow fall in the Triangle area is quite another. Just as the "Y2K" hype was winding down, in January of 2000, a powerful winter storm tracked along the coast and dropped an incredible 1 to 2 feet of snow over a large part of central North Carolina, from Southern Pines, up through the Raleigh-Durham-Chapel Hill-Cary region, and northward to the Virginia state line. Many people were homebound for days and without power for weeks, as the area's scant snow-removal equipment struggled to handle the massive amount of snowfall.

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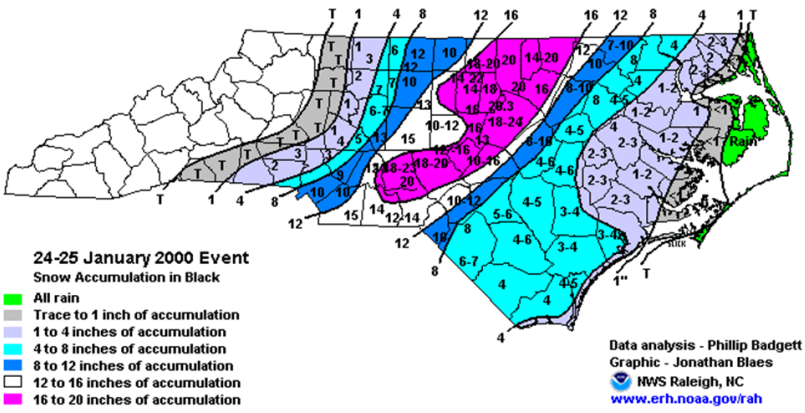
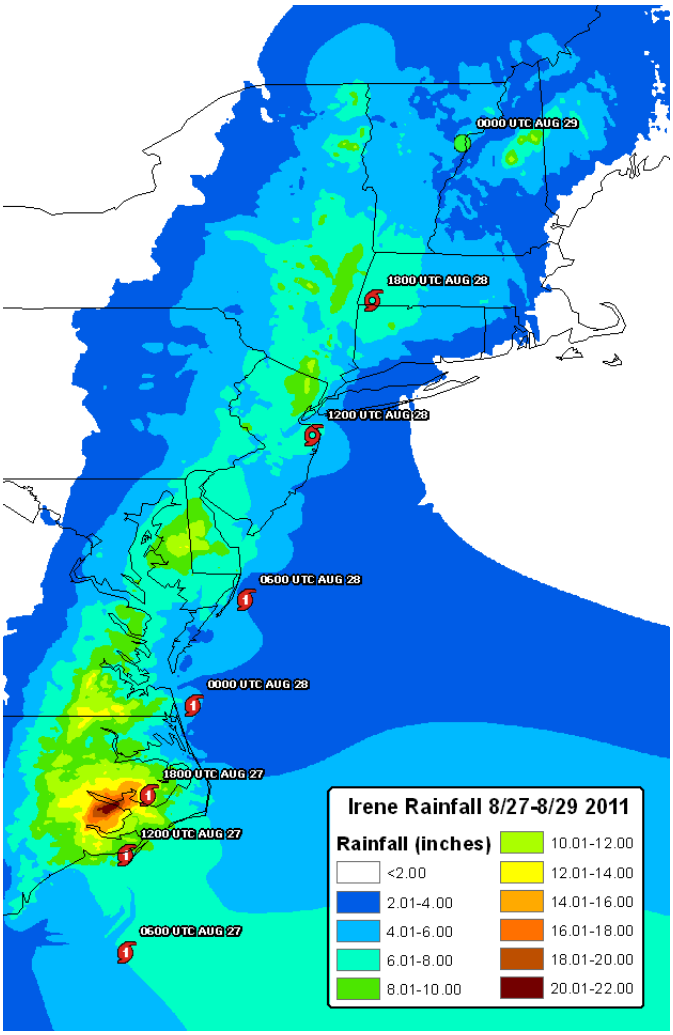


Active Tropical Season Brings Drought Relief



"One adage that one hears during particularly bad droughts is that 'it takes a flood to end a drought', and it certainly proved true in this case."

Central and eastern North Carolina were suffering from moderate to severe drought conditions due to a lack of rainfall and hot conditions which persisted from late spring into the late summer. There was even a small area of extreme drought conditions along the coast near Wilmington, where the rainfall deficit reached nearly 20 inches below normal.

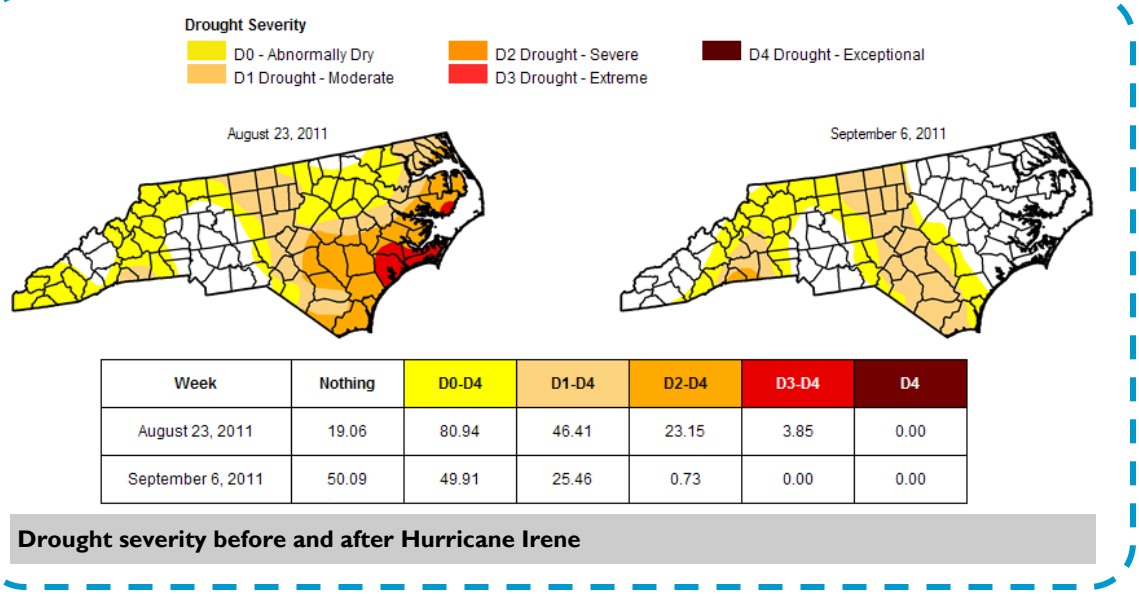
Rain began spreading into eastern NC on August 27th, as hurricane Irene moved north up the Atlantic coast, and areas east of Interstate 95 received some impressive rainfall amounts on the 27th and 28th. It could be considered fortunate that streams and rivers were running very low (a number were at record low levels), as the widespread 6 plus inch rainfall amounts would normally have caused extensive and damaging river flooding. As conditions were so dry, the river flooding was minor, and most of the resulting damage was agricultural, with many crops either drowned or lost due to field conditions being too wet to permit harvesting. One adage that one hears during particularly bad droughts is that "it takes a flood to end a drought", and it certainly proved true in this case, as Irene's rainfall erased the deficit and raised river levels back into the normal range over eastern NC.

Hurricane Irene was followed closely by Tropical Storm Lee, which moved up the Appalachians during the first week of September and provided widespread rain over the western half of the state. Much of central NC, and particularly the Triangle area, was on the periphery of the heavier rain from these tropical cyclones, and continues to experience mild drought conditions as we head into the winter.

Drought impacts are not as obvious during the cool season, but one indicator which will bear watching is Falls Lake, which is the water supply reservoir for Raleigh. The lake fell below normal early in the summer, and continued to show a rather steady decline through the fall. The lake currently has about 70 percent of its water supply remaining, and is forecast to remain near this level through the winter, even considering that the winter precipitation outlook is below normal. So, while there are no immediate water supply concerns, initially low conditions would allow a shortage to escalate quickly this spring as plants come out of dormancy and public water demand increases.

Lake Jordan, the other major water supply reservoir in central NC, has a larger drainage area upstream and has also received more rain than the Falls Lake watershed. As a result, Jordan rebounded quickly this fall, and is nearly a foot above normal as we head into winter.

-Mike Moneypenny



Week	Nothing	D0-D4	D1-D4	D2-D4	D3-D4	D4
August 23, 2011	19.06	80.94	46.41	23.15	3.85	0.00
September 6, 2011	50.09	49.91	25.46	0.73	0.00	0.00

Drought severity before and after Hurricane Irene

NOAA Winter Outlook Slightly Drier Than Normal

NOAA's Climate Prediction Center is forecasting drier than average conditions this winter, with an equal chance for above-, near-, or below-normal temperatures. This could also lead to above normal wildfire conditions across the southeast.

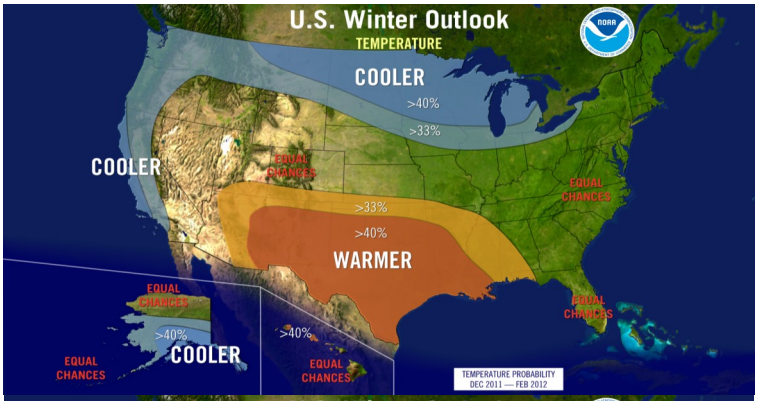
For the second year in a row, La Niña will play a large role in shaping the weather pattern as it is expected to strengthen and continue throughout the winter season. In addition, the lesser known and less predictable Arctic Oscillation could cause wide ranging temperature swings at various times this winter.

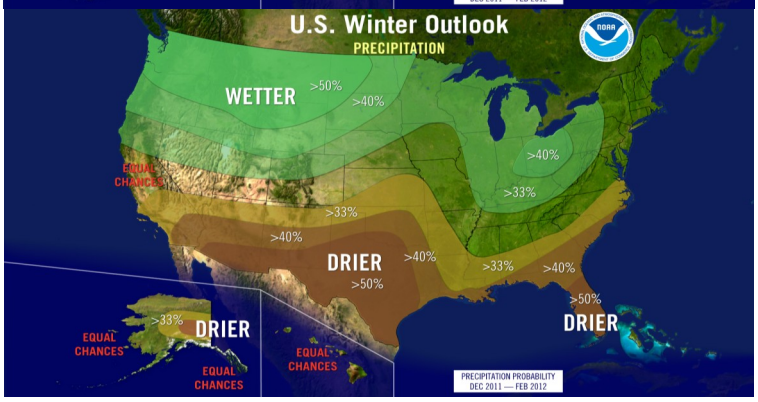
"The evolving La Niña will shape this winter," said Mike Halpert, deputy director of NOAA's Climate Prediction Center. "There is a wild card, though. The erratic Arctic Oscillation can generate strong shifts in the climate patterns that could overwhelm or amplify La Niña's typical impacts."

The Arctic Oscillation is always present and fluctuates between positive and negative phases. The negative phase of the Arctic Oscillation pushes cold air into the U.S. from Canada. The Arctic Oscillation went strongly negative at times the last two winters, causing outbreaks of cold and snowy conditions in the U.S. such as the "Snowmaggedon" storm of 2010. Strong Arctic Oscillation episodes typically last a few weeks and are difficult to predict more than one to two weeks in advance.

While the seasonal outlook may call for an average season, it is always important to remember that it only takes one storm to cause serious problems.

-Ryan Ellis (source: NOAA)





Don't Get Caught in the Cold!

Last winter season saw record breaking snowfall totals across portions of North Carolina, so does this mean we will "catch a break" this year, with a mild winter? While predictions are calling for better chances of a drier winter and equal chances for warmer or colder tempearatures, there is still uncertainty. We should still do our part to prepare. One good practice is to keep up with the latest conditions and forecasts from the National Weather Service. If a light accumulation of freezing rain or sleet is forecast, or if snow accumulations of 1 to 2 inches are expected, the NWS will issue a Winter Weather Advisory. If a quarter of an inch of freezing rain, a half-inch of sleet, and/or 3 or more inches of snow is expected, Winter Storm Watches and Warnings are issued. In order to provide as much planning time as possible, Watches can be issued as much as 48 hours in advance. Warnings are issued when the dangerous weather is highly likely or imminent within the next 24 hours.

Winter Storm Watch/Warning	3+" Snow accumulation	½" Sleet ¼" Freezing rain	hazards judged to pose a threat to life and property within 24 hours.
Winter Weather Advisory	1-2" Snow accumulation	Any accretion of sleet / freezing rain	hazards cause a significant inconvenience and warrant extra caution.
Blizzard Warning	Sustained or frequent gusts > or = 35 mph *AND* considerable blowing/drifting of snow reducing visibilities frequently < 1/4 mile		
Wind Chill Advisory	0° F or less with wind speeds 10 mph or more.		
Wind Chill Warning	-15° F or less wind speeds 10 mph or more.		

For a complete listing of all NWS Watch, Warning and Advisory Criteria please visit; http://www.erh.noaa.gov/rah/criteria/

Anyone who has been in North Carolina for more than a couple of years knows that ice is our most dangerous winter weather threat. Significant accumulations of ice, in the form of freezing rain, bring down trees, power lines and telephone poles. Power and communications services can be disrupted for weeks, as many residents experienced during the ice storm of December 2002 when millions from the Triangle to the mountains lost power.

Heavy snow is also no stranger to the area. The snow storm of January 2000 is still a vivid memory in the minds of most Triangle residents. During this storm, 18 to 24 inches of snow fell in less than 24 hours resulting in one of the snowiest winters on record.

Most deaths attributed to winter storms result from indirect dangers such as traffic accidents, falling trees, downed power lines, house fires and carbon monoxide poisoning resulting from improper indoor use of heat sources such as grills, stoves, and space heaters.

Also, make sure there is enough of the right type of fuel for alternative heat sources such as fireplaces, wood stoves, and space heaters. If you use a space heater, make sure it is in good working order with no loose wires or missing parts. Make sure it is stable, away from curtains or other flammable materials, in a place where it won't be knocked over. Never use charcoal or gas grills indoors as a source of heat, as carbon monoxide build-ups are deadly.

Is Your Home Prepared for Winter?

We think of our homes as the place we want to be when the weather turns cold and blustery. However, if certain precautions are not taken before a winter storm strikes, life at home can be just as miserable as the weather outside.

Do- stock an emergency supply of food and water prior to the onset of a winter storm. Include food items which require no cooking such as canned meats...peanut butter and other non perishables. Also do not forget to have necessary medicines and baby items on hand. A three to five day supply of food and medicine is generally sufficient. Also make sure you have a manual can opener.

Do- Keep an adequate supply of heating fuel (firewood, kerosene, etc.) at your home. Use your fuel sparingly as supplies may be in short order during winter storms. Use heaters and fuels properly and safely in order to avoid deadly fires and carbon monoxide.

Do- Conserve fuel by keeping your house cooler than usual and by temporarily "closing off" heat to some rooms.

Do- When kerosene heaters are used, maintain ventilation to avoid the build up of toxic fumes. Also, always refuel kerosene heaters outside and keep them at least 3 feet away from flammable objects. Use only approved fuel in these heaters. NEVER burn gasoline.

Do- Keep fire extinguishers on hand, and make sure your family knows how to use them. Know fire prevention rules.

Do- Keep on hand a flash light, battery powered radio, extra batteries and a first aid kit.

Do- Prevent water pipes from freezing by wrapping them with insulation or newspaper covered with plastic. In really cold weather, let your faucets drip slightly to help avoid freezing. If your pipes do freeze, remove the insulation and wrap the pipes in rags. Open every faucet in the house and pour hot water over the rag wrapped pipes. Also know how to shut off your homes water supply should water lines break.

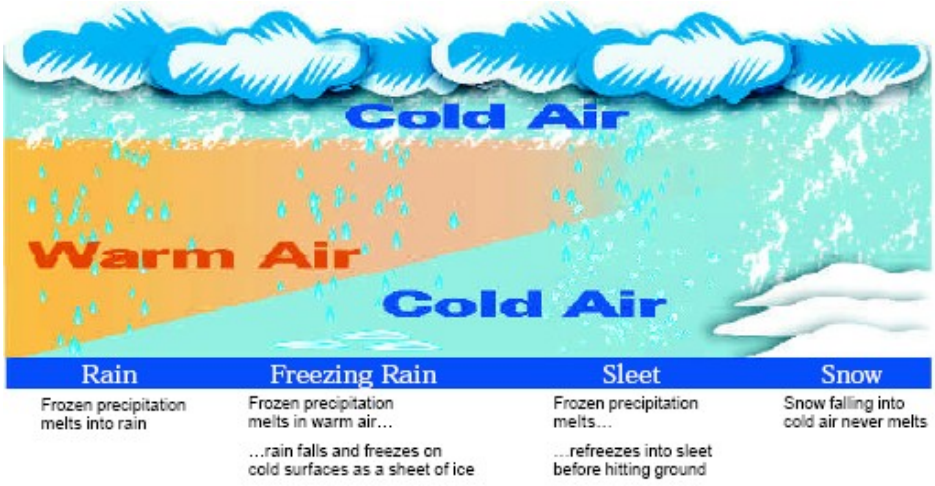
Do- Keep generators well

away from the home. Never run a generator in your garage or any other enclosed area. Carbon monoxide from the exhaust of the generator can be a silent killer. Also make sure your generator is properly wired to your home.
Do- Make sure that every family member knows how to evacuate the house in the event of a fire. Make sure you and your family designate an outdoor meeting place if you do have to leave your home quickly because of a fire.

Never- heat your home using a charcoal grill, gas grill or camp stove. Grills and camp stoves create deadly carbon monoxide fumes that will build up when used in your home. Always use grills outside.

Driving in Winter Weather

We all know how hazardous driving can be when ice and snow are on the ground. 75 percent of all winter weather related deaths occur on the road, either in accidents or people becoming stranded. Obviously, when the weather is bad and driving conditions are poor, the best bet is to stay at home. However, if you must venture out, the following tips could make for a safer journey.
Make sure your car is in good running condition. Make sure that your battery, antifreeze, windshield wipers, ignition and thermostat are all in good working order. Be sure your tires have enough tread. Replace any of these items if necessary.
Do- If you must go out when snow and ice are on the ground, let someone know your destination and when you plan to arrive.
Do- Clean snow and ice off all parts of your car before you drive away.
Do- Keep your gas tank as full as possible. This will not only give you added peace of mind, it also increases the weight of your car and this will provide additional traction.



Do- keep the following basic items in your car; windshield scraper and brush, jumper cables, a tow chain or rope, bag of sand or salt, a blanket, flashlight, first aid kit and road map.
Do- If you do begin to slide, take your foot off the gas and turn the steering wheel IN THE DIRECTION OF THE SLIDE. DO NOT apply the brakes as that will cause further loss of control of the car.

If you get stranded on the road stay in your car.

Do not seek shelter or a telephone unless they are close by or already visible. You can easily become disoriented in heavy snow and frigid temperatures.
Do- Set your directional lights to "flashing" and hang a cloth or distress flag from the radio aerial or window. In a rural or wilderness area, spread a large cloth over the snow to attract attention of rescue crews who may be surveying the area by airplane.
Do– Periodically turn on the car engine for brief periods. This will help provide heat inside the car. However, to avoid carbon monoxide gas buildup, clear the exhaust pipe of snow and leave a downwind window slightly open for ventilation.
Do– Make yourself visible by tying a colored cloth to your antenna or door, or by turning on your dome light when running the engine.
Do- Be careful not to use battery power. Balance electrical energy needs, the use of lights, heat and radio, with your supply.

Hypothermia occurs when the extremities are excessively cold (blue)

Improperly warming the body will drive cold blood from the extremities to the heart, leading to heart failure

You can keep up with winter forecasts, warnings and advisories by visiting the Raleigh NWS online at http://weather.gov/raleigh. Winter weather preparedness information from the North Carolina Division of Emergency Management can be found on the Internet at http://www.ncready.org/. For the latest road conditions and access to web cameras statewide, visit the Department of Transportation online at http://tims.ncdot.gov/tims/. For more winter weather safety tips, visit http://www.nws.noaa.gov/om/winter/.

All of us in the National Weather Service wish you a safe winter season!
-NWS Raleigh

This Year's NC State Student Interns Have Unique Experiences

Front: Whitney Rushing, Cathy Evans and Kevin Smith

Back: Robby James, Carly Kovacik and Carl Barnes

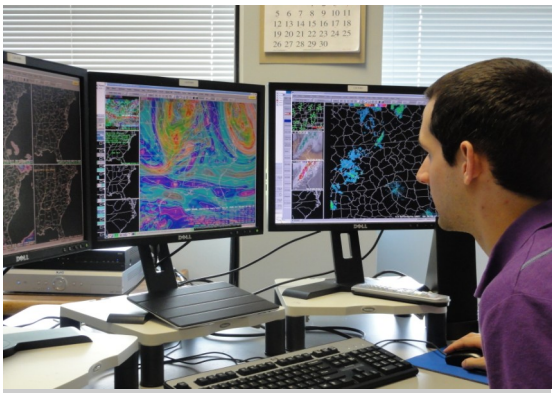
The NWS Raleigh has provided senior undergraduate and graduate meteorology students at N.C. State University internship opportunities since the late 1990s. The internship was formalized with an internship course for credit in 2004. Students who participate in the internship experience the initial portion of a career as a NWS meteorologist which usually spans 2-5 years over the course of 12 weeks. The students begin the internship performing data collection, quality control, monitoring NOAA Weather Radio, and performing hand analysis of surface and upper air data. Later in the internship, the students work alongside forecasters monitoring and producing aviation and fire weather forecasts along with forecasts of the short and long term. During the last few weeks of the internship, the students compose their own area forecast discussions that are often used and sent out with the forecast update.

In addition to the typical operational activities that take place on the forecast floor, the students participate in a few off site visits including trips to the KRAX WSR-88D Doppler radar and an Automated Surface Observing System (ASOS). The students also get an opportunity to participate in various training, seasonal familiarization, and outreach activities. This year was the first year the students were provided an opportunity to work on the Weather Event Simulator (WES) which allows meteorologists to simulate or experience an archived weather event in a training environment. The students went through a large scale review of the weather pattern to diagnose the potential of severe weather and then individually experienced the event acting as a NWS meteorologist monitoring radar data, issuing practice Severe Thunderstorm and Tornado Warnings, along with fielding severe weather reports.

One meteorology student this year had the experience of a lifetime. Carl Barnes was scheduled to work a long term forecast shift on the morning of April 16, 2011. Carl didn't practice an extended range forecast that day, but instead, for the next 8 hours, Carl sat alongside NWS meteorologists as they issued life-saving tornado warnings, evacuated to the tornado shelter as a tornado moved through Raleigh, and heard the reports of devastation and casualties. As Carl noted, "being in the office for such a historic event in North Carolina weather history, especially as a student just starting my career in meteorology, was an experience that will stay with me throughout my life. "

The internship has proven to be very successful with over 30 past students currently employed with NOAA or the NWS including a few current NWS Raleigh staff members. Other students have moved on to additional schooling or found careers elsewhere in the weather enterprise.

-Jonathan Blaes

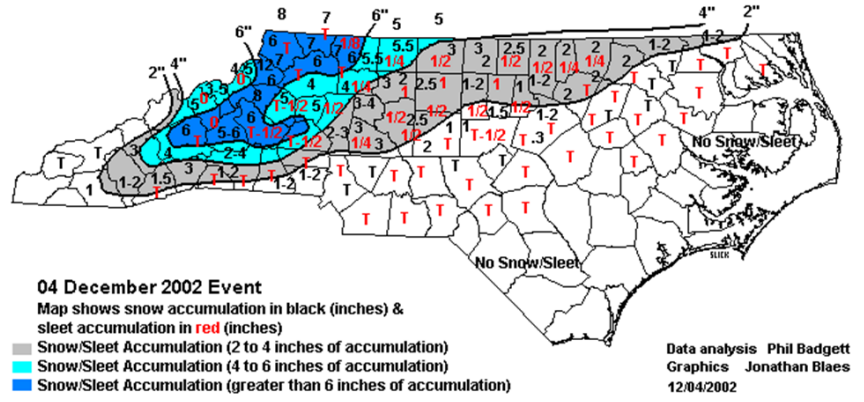


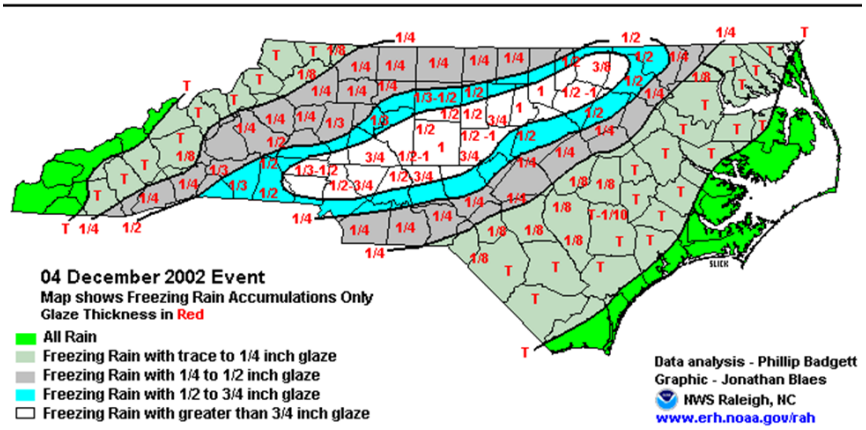
Carl Barnes at the NWS office in Raleigh

"One meteorology student this year had the experience of a lifetime."

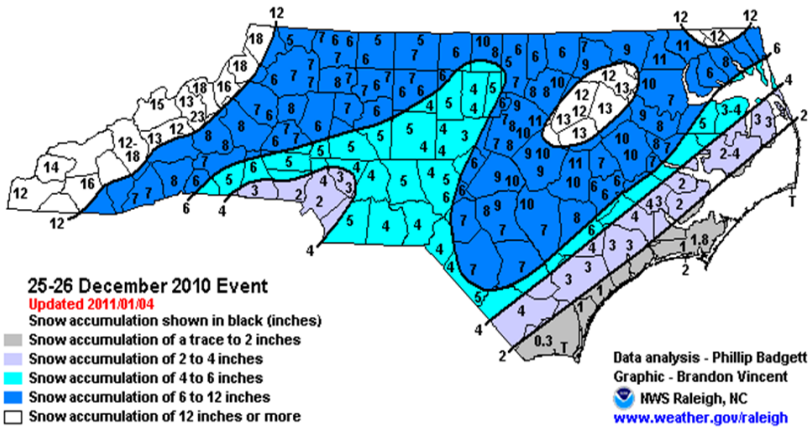
Remembering Winters Past (continued from page 1)

Experiencing an all-snow event, especially of this magnitude, is certainly not typical. Due to the location and geography of our state, freezing rain and sleet, alone or mixed with snow, occur more often than snow alone. In these situations, cold air pours into the state at the surface from the north, while warm and moist air from the Gulf flows up and over this cold air – leading to a wintry mix of freezing and frozen precipitation. In one of the worst ice storms to ever hit North Carolina, a treacherous combination of one half to one inch thick layer of ice, and one to four inches of snow, coated much of central North Carolina on December 4-5, 2002. Widespread tree damage and downed power lines resulted in lost power for nearly two million people in the region, and property damage was estimated at almost one hundred million dollars.





More recently, widespread heavy snow fell across the area last year on December 25th and 26th. This event began Christmas Day when a weak surface low over western North Carolina and strengthening winds aloft combined to bring 3-6 inches of snowfall to the Triad area (and up to a foot of snow in the mountains). This snow dissipated by that evening, but then another surface low developed near the Florida panhandle on Christmas night and intensified as it moved northeast along the southeast coast through Christmas Night and into the 26th. The Triangle area saw snowfall totals ranging from 3-5 inches around Chapel Hill and Siler City to around a foot in Wendell and Knightdale, which snarled post-Christmas travel. This low went on to produce blizzard conditions from New Jersey to New England with up to 20 inches of snow in some areas.



What are your memories of winter storms in central North Carolina? Visit our Facebook page (http://www.facebook.com/US.NationalWeatherService.Raleigh.gov), become a fan, and share with us your experiences with major winter storms in our area. Check out our case study summary page (http://www.erh.noaa.gov/rah/events/) for other historical weather systems that have affected our area. And remember to check out our home page at http://weather.gov/raleigh for the latest conditions and forecasts for your neighborhood, updated every 3 hours around the clock.

-Gail Hartfield

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SKYWARN Recognition Day

SKYWARN Recognition Day was developed in 1999 by the National Weather Service (NWS) and the American Radio Relay League (ARRL). It celebrates the contributions that volunteer Skywarn radio operators make to the NWS. During the recognition day, Skywarn operators visit NWS offices and contact other radio operators across the world.

The "day" is an actual 24-hour period that runs from 00Z to 24Z on the first Saturday of December. In 2011, Skywarn Recognition Day was held during the 24-hour period Universal Time Coordinated on December 3, or in Eastern Standard Time, from 7 PM December 2 to 7 PM December 3. Some NWS offices hosted amateur radio operators around the clock, while other NWS offices began contacts more in earnest during the day December 3.

The object of Skywarn Recognition Day is for all amateur stations to exchange QSO (a communication direct or by relay) information with as many other stations and NWS offices as possible on 80, 40, 20, 15, 10, 6, and 2 meter bands plus the 70 centimeter band. Usually, the information exchange is short, consisting of an amateur radio station's call sign, signal strength report, QTH (location in latitude and longitude or other indication), and a one or two-word description of the weather occurring at the station's site (e.g., "sunny", "partly cloudy", "windy", etc.). Frequently, brief other weather information such as the hourly temperature is shared.

While not exactly an amateur radio contest, different certificates are awarded depending on the number and type of contacts made.

In central North Carolina, members of Central Carolina Skywarn were at the NWS office in Raleigh. Central Carolina Skywarn, as well as members of Triad Skywarn, are integral parts of the Skywarn community. Part of the severe weather warning success of the NWS Raleigh office, year after year meeting severe weather warning accuracy, false alarm and lead time goals of the Government Performance and Results Act, can be attributed to the tireless efforts of the amateur radio operators of Central Carolina Skywarn and Triad Skywarn.

-Darin Figurskey

"SKYWARN Recognition Day was developed in 1999 by the National Weather Service (NWS) and the American Radio Relay League (ARRL)."